

b) a fluid inlet and outlet fluidly connected to the fluid channel, wherein the one or more feedthroughs enable fluid flow into and out of the fluid inlet and fluid outlet.

4. The processing chamber of claim 1, wherein the lid assembly further comprises one or more feedthrough pockets in which the one or more feedthroughs are received to connect the lid assembly to the retaining ring.

5. The processing chamber of claim 4, wherein the one or more feedthroughs comprise an enlarged engagement portion insertable into the one or more feedthrough pockets.

6. The processing chamber of claim 5, wherein the one or more feedthrough pockets comprise a pocket shoulder to receive a sealing element therein.

7. The processing chamber of claim 6, further comprising a fastener adapted to attach the feedthrough to the retaining ring.

8. The processing chamber of claim 7, wherein the retaining ring defines one or more fluid passages and one or more feedthrough channels fluidly connected to the fluid passages.

9. The processing chamber of claim 4, wherein the feedthrough comprises a channel along its length and one or more ports connected to the channel.

10. The processing chamber of claim 8, wherein the retaining ring comprises a pocket alignment shoulder adapted to align the lid assembly to the retaining ring.

11. The processing chamber of claim 1, wherein the first and second plates each comprise a portion of the fluid channel.

12. The processing chamber of claim 11, wherein the fluid channel is continuous between the inlet and the outlet.

13. The processing chamber of claim 12, further comprising a feedthrough pocket fluidly connected to the lid assembly passageway and adapted to connect to a feedthrough to secure the lid assembly to the retaining ring.

14. The processing chamber of claim 13, wherein the passageway forms a circuitous pattern substantially throughout the lid assembly.

15. The processing chamber of claim 14, wherein the passageway surface area comprises between about 30% and about 60% of the surface area of the lid assembly.

29. A processing chamber, comprising:

an enclosure having a first electrode for supporting a substrate in the enclosure;

and

a chamber cover having a second electrode opposed to the first electrode, the second electrode comprising:

a plate assembly having a bottom surface disposed at least partially in the enclosure and an upper surface connected to a support frame; and

one or more cooling channels disposed at least partially in the plate assembly; and

one or more fluid connectors fluidly connected to the one or more cooling channels.

30. The processing chamber of claim 29, further comprising a power source connected to the second electrode.

31. The processing chamber of claim 29, wherein the plate assembly is comprised of a material selected from the group consisting of graphite, polycrystalline silicon, quartz,

glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond coated materials, titanium oxide or combinations thereof.

32. The processing chamber of claim 29, wherein the plate assembly is comprised of a metal.

33. The processing chamber of claim 29, further comprising a backing plate adjacent a sidewall of the plate assembly opposite the first electrode.

34. The processing chamber of claim 33, wherein the backing plate is comprised of a metal and the plate assembly is comprised of a material selected from the group consisting of graphite, polycrystalline silicon, quartz, glassy carbon, single crystal silicon, pyrolytic graphite, silicon carbide, alumina, zirconium, diamond coated materials, titanium oxide or combinations thereof.

41. A processing chamber for processing a workpiece, comprising:
a workpiece support; and
a chamber cover facing said workpiece support, the chamber cover comprising:
a backing plate; and
a facing plate having at least one cooling channel disposed therein and defining one or more cooling pathways distributed over the area of the facing plate.

42. The chamber of claim 41, wherein the second plate comprises an electrode and the cooling channel is disposed at least partially between the first and second plates.

43. The chamber of claim 42, wherein the channel is partially formed between the first and second plates.

44. The chamber of claim 42, wherein the channel is defined by a groove in one of the plates and the generally smooth opposing face of the other plate.

45. The chamber of claim 42, wherein the channel is defined by grooves formed in both the first and second plates.
46. The chamber of claim 71, wherein the one or more cooling pathways are arcuate, radial, meandering or combinations thereof.
47. The chamber of claim 71, wherein the chamber cover is comprised of a dielectric material, a conductive material, a semiconductive material, or combinations thereof.
48. The chamber of claim 71, wherein one plate is comprised of one material and the other plate is comprised of another material.
49. The chamber of claim 47, wherein the plate facing the workpiece support is comprised of a silicon containing material.
50. The chamber of claim 47, wherein at least one plate is comprised of a metal or alloy thereof.
51. The chamber of claim 47, wherein at least one plate is comprised of aluminum oxide or aluminum nitride.
71. The processing chamber of claim 41, wherein the facing plate comprises:
a first plate; and
a second plate sealably engaged with the first plate.
72. The processing chamber of claim 1, wherein the lid assembly comprises a material selected from the group of aluminum oxide, aluminum nitride, silicon carbide, silicon, polysilicon and combinations thereof.

73. The processing chamber of claim 1, wherein the fluid channel is defined by a groove in one of the plates and the generally smooth opposing face of the other plate.

74. The processing chamber of claim 1, wherein the fluid channel is defined by grooves formed in both the first and second plates.

75. The processing chamber of claim 1, wherein the fluid channel is arcuate, radial, meandering or combinations thereof.

76. The processing chamber of claim 1, wherein the second plate may be textured to increase the surface area of the second plate.

77. The processing chamber of claim 29, wherein the plate assembly comprises one piece, wherein the cooling channels are formed laterally therethrough.

78. The processing chamber of claim 29, wherein the plate assembly comprises a first member and a second member coupled to one another, the second member having a bottom surface disposed at least partially in the enclosure and the first member having an upper surface connected to a support frame and one or more cooling channels disposed at least partially in the first member and located between the first member and the second member.

79. The processing chamber of claim 33, further comprising one or more baffle plates disposed between the backing plate and the second electrode.

80. The processing chamber of claim 78, wherein the one or more cooling channels are disposed in both the first member and the second member.